



## Instructor Guide

**Topic:** Hazardous Materials Operations Refresher

**Time Required:** Three Hours

**Materials:**

- 40-50 Sandbags
- Two 6-Foot Lengths of Two- or Four-Inch Pipe
- Two Combustible Gas Indicators
- pH Paper
- Sample of Corrosive and Combustible Liquids

**References:**

- IFSTA Hazardous Materials for First Responders; 2<sup>nd</sup> Edition
- IAFF Hazardous Materials for First Responders; 2<sup>nd</sup> Edition

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### PREPARATION:

**Objective :**

The student will demonstrate his/her knowledge and understanding of basic requirements for the hazardous materials operations first responder by satisfactory performance of practical activities.

**Overview:**

Hazardous Materials Operations Refresher

- First responder role and responsibilities
- Defensive control and containment measures
- Basic metering and monitoring
- Practical activities involving metering and control

## **Session 1 Hazardous Materials Operations Refresher**

- The student will demonstrate their knowledge and understanding of basic requirements for the hazardous materials operations first responder by satisfactory performance of practical activities.
- Demonstrate a basic knowledge of the role and responsibilities of a first responder at the hazardous materials operations level.
- Demonstrate a basic knowledge of various control and containment measures which the hazardous materials operations first responder can utilize.
- Demonstrate a basic knowledge of the use of selected metering devices and the use of the information obtained.
- Demonstrate, through practical activities, basic containment techniques and the use of metering devices.

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## **I. Role and Responsibilities (1-1-1)**

### **A. Terminology Review**

1. Lower explosive limit
2. Upper explosive limit
3. Specific gravity
4. Vapor density
5. Ignition temperature
6. Flash point
7. pH (power of hydrogen)
8. Effects of heat on substances

### **B. Product Identification**

1. Shipping papers
2. Placards and labels
3. Type of container
4. Occupancy and location

### **C. Control Access**

1. Identify zones
2. Secure area
3. Deny access

### **D. Assess Risk**

1. Product hazard
  - a. Flammable
  - b. Toxic
  - c. Corrosive
  - d. Reactive

## 2. Exposures

- a. People
- b. Property
- c. Environment

## 3. Factors contributing to risk

- a. Weather
- b. Terrain
- c. State of product
  - 1) Solid
  - 2) Liquid
  - 3) Gas (vapor)

## 4. Resources available

- a. First response capability
- b. Specialized resources
- c. Technical assistance

## E. Defensive Control Measures

- 1. Avoid contact with product
- 2. Within training and equipment levels

## **II. Defensive Control Measures (1-1-2)**

### A. Dilution

- 1. Can product be diluted?
- 2. Will dilution reduce hazard?
- 3. Do you have adequate resources to dilute?

### B. Vapor Suppression

- 1. Can vapors be suppressed?

2. How long will suppression control the hazard?
3. Do you have adequate resources for suppression?

#### C. Cool Container

1. Can it be done safely?
2. Do you have adequate water supply for cooling?
3. Will container cooling cause other problems?

#### D. Damming

1. Can it be done safely?
2. Do you have adequate resources for damming?
3. Basic damming techniques
  - a. Underflow dam for products lighter than water
  - b. Overflow dam for products heavier than water

#### E. Diking

1. Can it be done safely?
2. Do you have adequate resources for diking?
3. Involves constructing barrier around opening or area

#### F. Diverting

1. Can it be done safely?
2. Do you have adequate resources for diverting?
3. Involves directly flow elsewhere

### **III. Basic Metering (1-1-3)**

#### A. Use of Meters

1. Detect presence of substance
2. Provide value relative to substance present
3. Used to determine zones and assess risk and action

#### B. Types of Meters

1. Combustible gas indicator
  - a. Measures percentage of lower explosive limit
  - b. Does not measure concentration of vapors
  - c. Only measures vapor
  - d. Alarms at 10% of LEL
  - e. Must meter at all levels
  - f. Review use and operation

2. Oxygen meter
  - a. Measures percentage of oxygen in air
  - b. Alarms at 19.5% or 23.5%

3. Carbon monoxide
  - a. Measures parts per million
  - b. 35 ppm or less acceptable
  - c. Tasteless, odorless, colorless gas

4. pH paper
  - a. Use to measure corrosive level of liquid
  - b. Paper strip changes color; requires chart for interpretation
  - c. 7 considered neutral; 0-7 acids, 7-14 bases
  - d. Review use

#### C. Interpretation of Data

1. Percentage of LEL indicates possibility of fire
  - a. If meter goes to 100 immediately, substance is above LEL
  - b. If meter is below 100, is source controlled?
  - c. Has area been checked to insure that vapors have not moved?

- d. Is vapor heavier or lighter than air?
2. pH level indicates possibility of corrosive
  - a. If corrosive, avoid contact
  - b. May require containment to control further damage
  - c. May require materials to neutralize by technicians

#### **IV. Practical Activities (1-1-4)**

**NOTE:** Divide class into four equal groups and assign each group to one station. As work is completed, student will rotate to subsequent stations until all stations are completed.

##### **A. Constructing Overflow Dam**

1. Determine that product has specific gravity of more than one
2. Determine location of dam
3. Place damming material
4. No drain pipe required since material will sink, allowing water to flow over dam

##### **B. Constructing Underflow Dam**

1. Determine that product has specific gravity of less than one
2. Determine location of dam
3. Place initial damming material
4. Insert drain pipe and secure
5. Place remaining damming material

##### **C. Diking and Diverting**

1. Determine location of dike based on terrain and flow
2. Determine placement of diking material
3. Place diking material
4. Continually reassess dike effectiveness

#### D. Metering

1. Turn on and check calibration of meter
2. Place meter near sample and take reading
3. Record sample number and meter reading
4. Move to next sample and repeat

#### E. pH Paper

1. Tear off short piece of pH paper and place in tweezers
2. Place pH paper in sample and take reading
3. Check color of paper against chart
4. Record sample number and paper reading
5. Move to next sample and repeat

**NOTE:** Each student should sample as least one product with meter and pH paper and record reading, number of sample, and name.

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#### **SUMMARY:**

##### **Review:**

##### Hazardous Materials Operations Refresher

- First responder role and responsibilities
- Defensive control and containment measures
- Basic metering and monitoring
- Practical activities involving metering and control

##### **Remotivation:**

Stress the importance of operating only with the limits of equipment and training, and generally in a defensive mode. Also stress the importance of personal safety and proper assessment before taking action.

##### **Assignment:**

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#### **EVALUATION:**